

**InterAgency
Memorandum of Agreement
Between
Department of Commerce
NOAA, Office of Oceanic and Atmospheric Research (OAR)
and
National Aeronautics and Space Administration
Dryden Flight Research Center
for
Atmospheric Science Research Mission Analyses and
Flight Demonstration of Unmanned Aerial Vehicles Technologies**

I. PURPOSE

This Memorandum of Agreement (MOA) is intended to allow the National Aeronautics and Space Administration Dryden Flight Research Center (NASA/DFRC) to collaborate with the National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) in the development and demonstration of Unmanned Aerial Vehicles (UAV) technologies, integrated platforms and atmospheric science research missions on a cost share partnership basis. The information gained from these UAV development efforts will be of mutual benefit to both parties.

II. Authority

This MOA is undertaken on the part of OAR in accordance with 33 U.S.C. § 883d, which authorizes the Secretary to conduct investigations and research in geophysical sciences, as well as 15 U.S.C. § 1525, the Department's Joint Project Authority, which provides that the Department may enter into joint projects with nonprofit, research, or public organizations on matters of mutual interest, the cost of which is equitably apportioned.

This MOA is undertaken by NASA/DFRC in accordance with the National Aeronautics and Space Act of 1958, as amended, 42 U.S.C. § 2471 et seq. specifically; 42 U.S.C. § 2473(c)(5) and (c)(6).

III. BACKGROUND

NOAA/OAR is developing operational mission concepts for a family of UAVs designed to accomplish a variety of missions. These UAVs are intended for use throughout the Department of Commerce and are not solely associated with any particular NOAA Laboratory, Division or Center. Some of these UAVs will be used in mixed fleet airborne science missions and may require the flight test support of piloted NASA/DFRC aircraft such as the P3, DC-8, ER-2, or WB57. Such missions may also require use of UAV platforms, such as Proteus, Altair, Pathfinder/Helios or Global Hawk, available to NASA/DFRC; or might require development of derivative or entirely new UAV platforms to accommodate specific NOAA mission needs.

NASA/DFRC has a successful history of design and test of UAV projects and, unlike the various service test organizations, has access to and can make available several UAV platform options and other support resources required to perform the NOAA flight test missions. Some facility capabilities, such as ground control stations, may need further development depending on the particular demonstration mission needs.

IV. OBJECTIVES

The primary objective of this MOA is the requirements definition, development and flight demonstration of selected UAV technologies, science instruments, platforms and information systems to evaluate integrated system performance under actual flight conditions. Emphasis will be placed on developing and conducting UAV flight demonstrations consistent with NOAA and NASA short-term and long-term atmospheric science objectives for weather forecasting, flood forecasting, air quality monitoring and forecasting, severe storm detection and tracking, climate prediction, ecosystem monitoring, and disaster management. UAVs will provide access to remote worldwide regions, including the oceans and polar regions, and will gather detailed vertical profile information would be obtained. This data will include meteorological state variables, atmospheric chemistry and aerosols, and will fill critical observational gaps in current data. The underlying motivation is development of innovative, cost effective solutions to long-term NOAA operational needs for the benefit of the public good.

UAV mission analyses, sub-system and instrument design and integration, and flight tests may be conducted at various range facilities and unrestricted airspace. All flight test activity will be in accordance with NASA/DFRC policies and guidelines for UAV operations and also compliant with host range or Federal Aviation Administration/Air Traffic Control (FAA ATC) requirements. Possible host ranges includes, but are not limited to, the United States Air Force Flight Test Center (AFFTC) range at Edwards Air Force Base, California, the U.S. Navy ranges at China Lake, California and the Pacific Missile Range Facility, Hawaii, as well as sites outside of restricted airspace as appropriate. Initial opportunities for collaborative UAV missions may commence as early as the first quarter of fiscal year 2004, with systems integration and flight test opportunities arising as early as the third quarter of fiscal year 2004.

Specific projects to be performed under this MOA will be defined by Implementing Arrangements (IA). Each IA will specify the technical scope of the project, management responsibilities, financial arrangements, schedule estimates, procedures, and other appropriate matters. For cooperative efforts between NASA and specific OAR Laboratories, the IA can be signed for NOAA by the Director of the respective OAR Laboratory.

V. RESPONSIBILITIES

- A. NOAA Forecast Systems Laboratory (FSL) and Environmental Technology Laboratory (ETL) will:

1. Provide the principal interface between the NOAA OAR Laboratories, Centers and Programs and NASA/DFRC, for the purposes described in this agreement;
2. Define operational mission concepts, observation requirements and operational scenarios; such missions include, but are not limited to:
 - a. Pacific Land-falling Jets Experiment (PACJET)
 - b. Pacific Plus Experiment (PAC-PLUS)
 - c. Global Universal Profiling System (GUPS)
 - d. Hurricane Tracker
 - e. Severe Storm Penetrator
 - f. Peacewing Prototype Project (PPP)
3. Provide a designated NOAA Principle Investigator for science mission demonstrations performed under subsequent IAs to this agreement;
4. Develop and conduct operational mission analyses;
5. Define mission success criteria and minimum acceptable Technology Readiness Levels to facilitate transition from developmental to operational phases;
6. Define, develop and/or provide UAV payload instruments for use in mission demonstrations;
7. Participate in flight test planning, risk management and configuration control procedures with NASA/DFRC, as deemed appropriate for each specific demonstration mission;
8. Cost share with NASA/DFRC in the instrument integration and flight demonstration phases, as specified under subsequent IAs to this agreement;
9. Develop and integrate information systems to accommodate UAV science data returns with existing, or emerging, NOAA infrastructure;
10. Participate in establishing and maintaining an inter-agency civil UAV development roadmap, in partnership with NASA, the National Science Foundation (NSF), the Environmental Protection Agency (EPA) and other interested parties;
11. Be responsible for development of dual-use (NASA and NOAA) UAV payloads.

B. NASA/DFRC will:

1. Provide the principle interface between the NASA Offices of Aerospace Technology (Code R) and Earth Science (Code Y) and NOAA/OAR organizations, for the purposes described in this agreement;
2. Incorporate NOAA operational mission requirements in the NASA UAV Mission Portfolio as a means of identifying performance capability gaps, candidate technology solutions and opportunities for collaborative UAV mission demonstrations;
3. Be responsible for development, integration and demonstration of dual-use (NASA and NOAA) UAV technologies and platforms, as specified in subsequent IAs to this umbrella agreement;
4. Be responsible for safe mission planning and execution of UAV science mission and technology demonstrations, as specified in subsequent IAs to this umbrella agreement;

5. Be responsible for securing FAA approval for all flight activities conducted within the National Airspace System, as such missions are specified in subsequent IAs to this umbrella agreement;
6. Facilitate technology transfer and transition of UAV capabilities from NASA Research Centers and UAV industry platform and subsystem providers to NOAA research and operational users;
7. Collaborate with NOAA on publishing results obtained jointly under this agreement and subsequent IAs;
8. Establish and maintain an inter-agency civil UAV development roadmap, in partnership with NOAA, NSF, EPA and other interested parties.
9. Provide the required test facilities and personnel as defined in specific test plans agreed upon by the Parties.
10. Provide host services to NOAA/OAR and/or UAV platform providers on a negotiated basis in the applicable IAs, including, but not limited to: office space, utilities, access to shop support, and other functions as required to support the test operations.

VI. KEY PERSONNEL

The personnel listed under this section are designated as the key officials for their respective organization. Those key officials are the principal points-of-contact between the Parties in the performance of this agreement.

NOAA/FSL

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VII. PAYMENTS

Exchange of inter-agency funds may occur under this agreement as delineated under subsequent IAs. Each party will be responsible for equitably apportioned cost shares for activities specified in the subsequent IA's to this umbrella agreement.

VIII. LIABILITY AND RISK OF LOSS

1. Both NOAA/OAR and NASA/DFRC retain the right to investigate, adjudicate, settle, pay, or deny any claim of liability made against the United States through the alleged actions or inactions of that organization's employees or agents. Both parties agree to cooperate in investigations conducted by the other.
2. For each planned test activity, Safety Review Boards (or equivalents), as agreed by the Parties, will establish levels of risk and factors to mitigate risk of injury, death, or damage to test facilities and/or aircraft (including UAV) components. NASA/DFRC will ensure proper approval is obtained for the level of risk involved in each test.
3. With regard to activities undertaken pursuant to this MOA, neither Party shall make any claim against the other, employees of the other, the other's related entities (e.g., contractors, subcontractors, investigators or their contractors or subcontractors), or employees of the other's related entities for any injury to or death of its own employees or employees of its related entities, or for damage to or loss of its own property or that of its related entities, whether such injury, death, or damage arises through negligence or otherwise, except in the case of willful misconduct.

IX. ADDITIONAL TERMS

1. The schedule and milestones for the specific tests and projects will be jointly determined by NOAA/OAR and NASA/DFRC under subsequent Implementing Arrangements.
2. Under this agreement, responsibility for airworthiness and flight safety of the UAV during the flight test activities will be as agreed on by the parties in each Implementing Agreement. NASA/DFRC will retain range safety responsibility and some ground/facility safety responsibility as agreed on. In the case of a mishap, the lead for the Mishap Investigation Team will be determined after consultation between Parties to the respective IAs. The mishap investigation will be conducted in accordance with NASA NPG 8621.1 (NASA Procedures and Guidelines for Mishap Reporting, Investigation and Record Keeping) and DCP-S-001 (Aircraft Mishap Response Procedure) with NOAA and UAV contractor participation on the investigation team.

3. Third Party Liability Insurance will be required for all flights of all project conducted under this Agreement and will be the responsibility of the UAV contractor. Proof of compliance is required prior to the first flight of each project.

4. The terms of this MOA take effect on the date appearing beside the last signature below. Either Party may unilaterally terminate its participation in this MOA, without liability incurred, by providing ninety (90) days written notice to the other Party.

This MOA shall remain in effect while NOAA/OAR and NASA/DFRC continue to have active test requirements and capabilities; a cooperative relationship continues to be beneficial to both Parties; and it serves as an efficient means to achieve viable testing; or for a period of five (5) years, whichever comes first.

5. Any modification to this Agreement shall be executed in writing and signed by an authorized representative of each Party.

6. The Parties' ability to perform their obligations under this MOA is subject to the availability of appropriated funds, pursuant to the Anti-Deficiency Act (31 U.S.C. § 1341).

FOR NOAA/OAR:

FOR NASA/DFRC:

LOUISA KOCH
Deputy Assistant Administrator
Oceanic and Atmospheric Research

KEVIN L. PETERSEN
Director
Dryden Flight Research Center

Date: _____

Date: _____